Socio-economic Conditions and Health Status: A Case Study of Odisha

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Abstract: *Socio-economic conditions of a society are often considered to be one of the significant determinants of the disparate health conditions observed among its members. The present study is focussed upon the district level variations in socio-economic status as well as health status of the people in Odisha. It attempts to evaluate socio-economic conditions and health status in 30 districts of Odisha for the year 2011. The present study paper also attempts to examine the correlation between socio-economic condition and health status in the districts of Odisha. Socio-economic conditions have been studied with the help of three indicators, namely, per capita income, rate of urbanization and literacy rate. To examine the health status of the people, infant mortality rate, maternal mortality rate and crude death rate have been selected as the key indicators. Each indicator has been standardised through z-score and then composite index calculated to show the spatial variations in socio-economic conditions and health status. Carl Pearson's coefficient of correlation method has been used to determine the association between socio-economic condition and health status. The analysis reveals that there are striking variations in socio-economic conditions and health status from district to district. However, the correlation between these two components is moderately negative which indicates that the health status of a place is not merely a function of socio-economic conditions but also a manifestation of other correlates like health infrastructure.*

Keywords: *Socio-Economic Conditions, Per-Capita Income, Literacy Rate, Health Status, Maternal Mortality Rate, Crude Death Rate.*

1. INTRODUCTION:

According to World Health Organization (W.H.O) health is a state of complete physical, mental and social well-being and not merely an absence of disease or infirmity. Good health is a livelihood asset that enables people to participate in work and socio-economic development. Illness, on the other hand, causes misery and impoverishment. Health conditions depend upon a number of factors including: (i) income and poverty levels (ii) food security, food pricing and malnutrition (iii) availability of professional medical attendants, paramedical professionals, quantity and quality of health infrastructure (iv) socio-economic development, literacy and health awareness, and (v) physical and economic accessibility to private or public health care system. The relationship between socio-economic conditions and health status is a very popular perception. So, it would be interesting to examine whether these two variables move in the same direction or not.

Health status may be taken as a combined product of three key indicators, that is, Infant Mortality Rate (I.M.R), Maternal Mortality Rate (M.M.R), Crude Death Rate (C.D.R). The present study combines these indicators to arrive at a composite value (z-score) of health status for different districts of Odisha. I.M.R is a measure of mortality among infants. "Infants are defined in demography as an exact age group, namely age 'zero' or those children in the first year of life, who have not yet reached age one". I.M.R is defined as the ratio of the infant deaths in a calendar year to the number of live births recorded in that year (Hassan, 2005). IMR can be computed in the following manner: I.M.R= (Do/B) K

Where, Do is the number of infants death during a calendar year, B is the total live births recorded in that year and K is 1,000.

Maternal mortality refers to the occurrence of death of a woman during childbearing process. M.M.R is defined as the number of maternal deaths per 100000 (or, in some cases per 10,000) live births in a calendar year. Numerically, it is expressed in the following manner: M.M.R = (Dm/B) K. Where, Dm is the number of maternal deaths, B is the number of live births and K is a constant.

Calculation of Crude Death Rate requires the data on number of deaths in a calendar year in an area and its mid-year population. C.D.R is the number of deaths occurred during a calendar year per thousand persons. It is calculated as follows-: (D/P) K. Where, D is the total number of deaths registered during a calendar year, P is the total population at the middle of the year, K is constant, which is usually taken as 1,000.

Socio-economic condition may be seen as a combined product of three indicators viz. per-capita income, literacy rate and level of urbanization. It is defined as the relative position of a family or individual on a hierarchical social structure, based on their access to or control over wealth, prestige and power (Mueller, 1981). Sometimes, it is

"a broad concept that refers to the placement of persons, families, households and census tracts or create or consume goods that are valued in our society" (Miech & Houser, 2001). Per capita income is the per head income that is calculated as total income of a district divided by total population of that district. The Population Commission of the United Nations defines literacy as "the ability of people to read and write a simple message in any language with some understanding". Literacy rate is defined as the population of literates in the population aged 7 year and above. Level of urbanisation is calculated as rate of urban population to total population. The indicators are standardized through z-score method to obtain the composite z-score for socio-economic condition across the districts of Odisha. Standard deviation method has been followed for grouping 30 districts into four categories.

2. LITERATURE REVIEW:

Debapriya and Mohanty (2008) try to evolve a sound statistical methodology to measure the regional imbalances prevailing in the levels of development of education and health care facilities in Odisha. Using Iyengar & Sudarshan's method (1982) of building the indices for ranking the individual districts, they conclude that the magnitude of the inter-district disparity in terms of development of education & health care infrastructure in the state is quite high and only five districts located in the coastal region emerge as highly developed districts. Further, and in sharp contrast, weak urbanization, low levels of literacy and weak planning process in the past led to the growth of a large sea of backward region. The backwardness of lagging regions in social infrastructure is mainly explained by the distance from` central places, power centers and highly developed regions` largely explains. The poor economic performance of the KBK districts, which form a part of the backward region, may be traced to their poor performance in the development of the social infrastructures such as health care and educational facilities.

Singh and Rahaman (1998) study the housing conditions and health in low income households. They use primary data on the housing condition covered status of the house, type of house, number of rooms, ventilation conditions etc. For health conditions, factors such as family size, multipurpose or separate house for residential, industrial & commercial purpose, room space have been taken into account. They conclude that the existing housing conditions are the greatest health burden on the lower income households and suggest that housing conditions of the poorer households need to be improved because if economic conditions of the lower income households improve, the disease profile is likely to change.

Varadarajan and Deivamani (2000) study the health status in Tamil Nadu selecting indicators like birth rate, death rate, infant mortality rate and life expectancy at birth. Using regression model, they conclude that birth rates are greatly influenced by Intra Uterus Device users, Oral pills users, Female literacy etc.

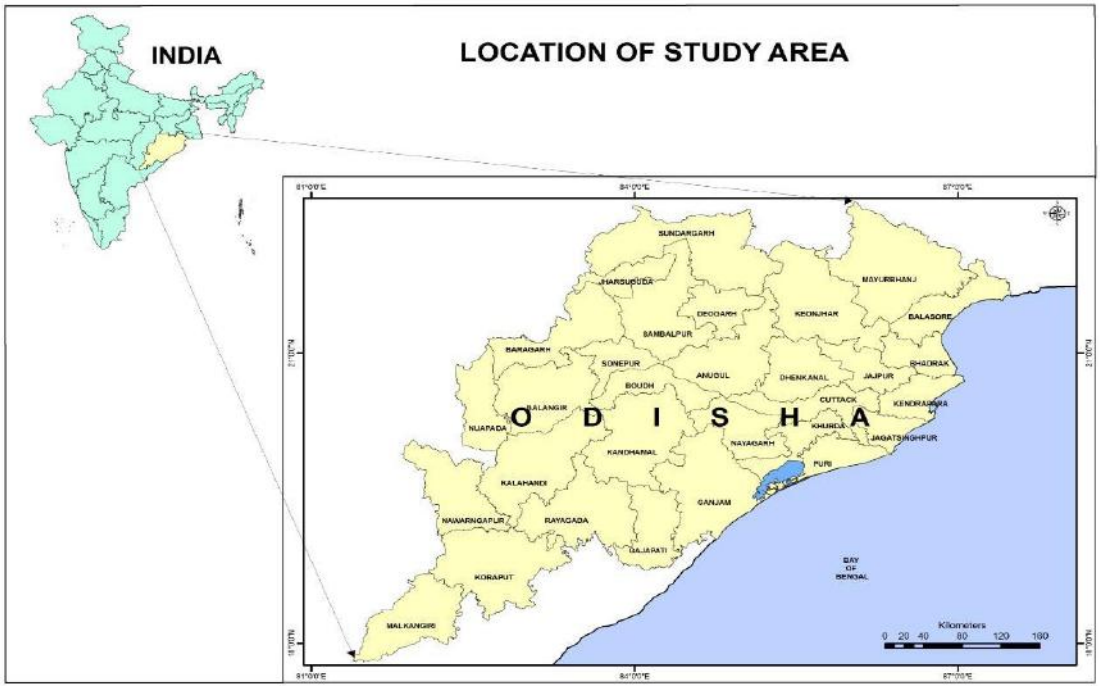


Fig. No.1

3. OBJECTIVES:-The present study has following objectives-

- To study the existing socio-economic conditions in the districts of Odisha
- To study the existing health status in the districts of Odisha.
- To examine the relationship between socio-economic condition and health status in Odisha.

4. MATERIALS AND METHODS: The present work is based upon secondary sources of data collected from the following sources:

(i) Bureau of Economics and Statistics, District Domestic Product Table, Odisha, 2009-10, for per capita income.
(ii) Provisional Population Totals, Odisha Series 22, Census of India, 2011, for Literacy and Urbanization.
(iii) Annual Health Survey Bulletin, 2010-11 for Infant Mortality Rate, Maternal Mortality Rate, Crude Death Rate.

Besides this, different books and journals were consulted for literature.

The present study involves quantitative techniques like Z-score, Composite Index, Standard Deviation, Coefficient of Correlation method have been used. For this study, all the indicators of socio-economic condition and health status of the districts have been examined with the help of Z-score technique for the year 2011. Z-score technique may be explained as follows:-

Zij = Xi – Mean/SD
Where Zij = Standard score of the ith observation
Xi = Original value of the observation
Mean = Mean of X
SD = Standard deviation of X

Further, Composite Standard Score (CSS) has been used so that the result can be obtained on a common scale.

$$CSS = \sum Zij/N$$

Where Zij indicates "Z" score of an indicator j in district i, N refers to number of indicators

CSS values are grouped through standard deviation method and then presented in a choropleth map to show variation among districts with regard to Socio economic condition, and the health status.

Steps for grouping of CSS value through Standard Deviation method**-:**

- High Category: Mean +1 standard deviation to Mean +2 standard deviation
- Medium Category: Mean to Mean +1 standard deviation
- Low Category: Mean -1 standard deviation mean
- Very low Category: Mean-2standard deviation to mean - 1 standard deviation

Coefficient Correlation (r) = $\frac{n\sum XY-(\sum X)(\sum Y)}{\sqrt{[n\sum X^2-(\sum X)^2]\times[n\sum Y^2-(\sum Y)^2]}}$

Test of significance: T-test would be carried out to check the significance of the correlation value obtained. The test carried out in the following manner-:

$$t = r\frac{\sqrt{n-2}}{1-r^2}$$

Where, r = the calculated value of correlation coefficient i.e. - 0.27
n = the no. of districts i.e.30

5. RESULTS AND DISCUSSION: Table 1. Presents the Composite Z-scores of respective districts of Odisha to determine its socio-economic condition.

Section-I: Socio-economic Conditions:

Table 1. SOCIO-ECONOMIC CONDITION IN ODISHA

Sl.No	Districts	Composite z-score	category
1	Bargarh	-0.58	low
2	Jharsuguda	0.62	high
3	Sambalpur	-0.05	medium
4	Debagarh	-0.5	low
5	Sundargarh	-0.02	medium
6	Kendujhar	0.06	medium
7	Mayurbhanj	-0.91	low
8	Baleshwar	-0.41	medium
9	Bhadrak	-0.37	medium
10	Kendrapara	-0.34	medium

11	Jagatsinghpur	0.01	medium
12	Cuttack	0.06	medium
13	Jajpur	-0.29	medium
14	Dhenkanal	-0.27	medium
15	Anugul	0.46	high
16	Nayagarh	-0.55	low
17	Khordha	0.31	high
18	Puri	-0.29	medium
19	Ganjam	-0.51	low
20	Gajapati	-1.03	very low
21	Kandhamal	-0.006	medium
22	Baudha	-0.52	low
23	Sonpur	-0.59	low
24	Balangir	-0.72	low
25	Nuapada	-1.04	very low
26	Kalahandi	-0.98	very low
27	Rayagada	-1.13	very low
28	Nabarangapur	-1.51	very low
29	Koraput	-1.07	very low
30	Malkangiri	-0.82	low

Note: The composite z-score value is computed by the author from the socio economic indicators

The composite z-score value for socio-economic indicators reveal that the districts of Odisha may be grouped into four categories: high (0.08 and above), medium (-0.44 to 0.07), low (-0.43 to -0.93), very low (-0.94 and below).

Table 2: Categorization of districts on the basis of Socio-Economic Condition in Odisha

Composite Z-score value	Categories	Districts
(0.08 and above)	High	Angul, Khordha, Jharsuguda
(-0.44 to 0.07)	Medium	Sambalpur, Sundargarh, Kendujhar, Baleshwar, Bhadrak, Kendrapara, Jagatsinghpur, Cuttack, Jajpur, Dhenkanal, Puri, Kandhamal
(-0.43 to -0.93)	Low	Bargarh, Debagarh, Mayurbhanj, Nayagarh, Ganjam, Baudha, Sonpur, Balangir, Malkangiri
(-0.94 and below)	Very low	Gajapati, Nuapada, Kalahandi, Rayagada, Nabarangapur, Koraput

Source: Table 2.

Table 2 reveals that among the districts of the study region, composite z-score varies from -1.51 in Nabarangapur to 0.62 in Jharsuguda district. It can be studied from Table-1 that Jharsuguda (0.62), followed by Angul (0.46), Khurdha (0.31) are districts of high socio-economic condition. It may be noted that 12 districts are comes under moderate socio-economic condition. They are Kendujhar (0.06), Cuttack (0.06), Jagatsinghpur (0.01), Kandhamal (-0.006), Sundargarh (-0.02), Sambalpur (-0.05), Dhenkanal (-0.27), Puri (-0.29), Jajpur (-0.29) Kendrapara (-0.34), Bhadrak (-0.37), Baleshwar (-0.41).

The regional variation in socio-economic condition among districts is also obvious in Figure-2. Though Kandhamal, Sundargarh, and Kendujhar come under this category because of their high score in per capita income on the one hand; socio-economically developed district Cuttack comes under this category instead of in high socio-economic condition because of its low score in per capita income, on the other.. Nine districts of low level of socio-economic condition are Bargarh (-0.58), Debagarh (-0.5), Mayurbhanj (-0.91), Nayagarh (-0.55), Ganjam (-0.51), Baudha (-0.52), Sonpur (-0.59), Balangir (-0.72), Malkangiri (-0.82). All the districts of this category have low score in level of urbanization. The districts coming under very low level of socio-economic condition are six districts of southern Odisha viz. Nabarangapur (-1.51), Gajapati (-1.03), Nuapada (-1.04), Kalahandi (-0.98), Rayagada (-1.13). These districts are in the bottom of the ladder in socio economic condition because of their backwardness and having very low score in literacy rate and levels of urbanization.

Section-II: Health:

Figure 2 and Table 4. depict categorization of districts of Odisha on the basis of their health status. The health status scores vary from -1.03 in Angul to 1.31 in Balangir. It means Angul ranks top and Balangir in the bottom position among 30 districts of Odisha as the study is based on negative indicators.

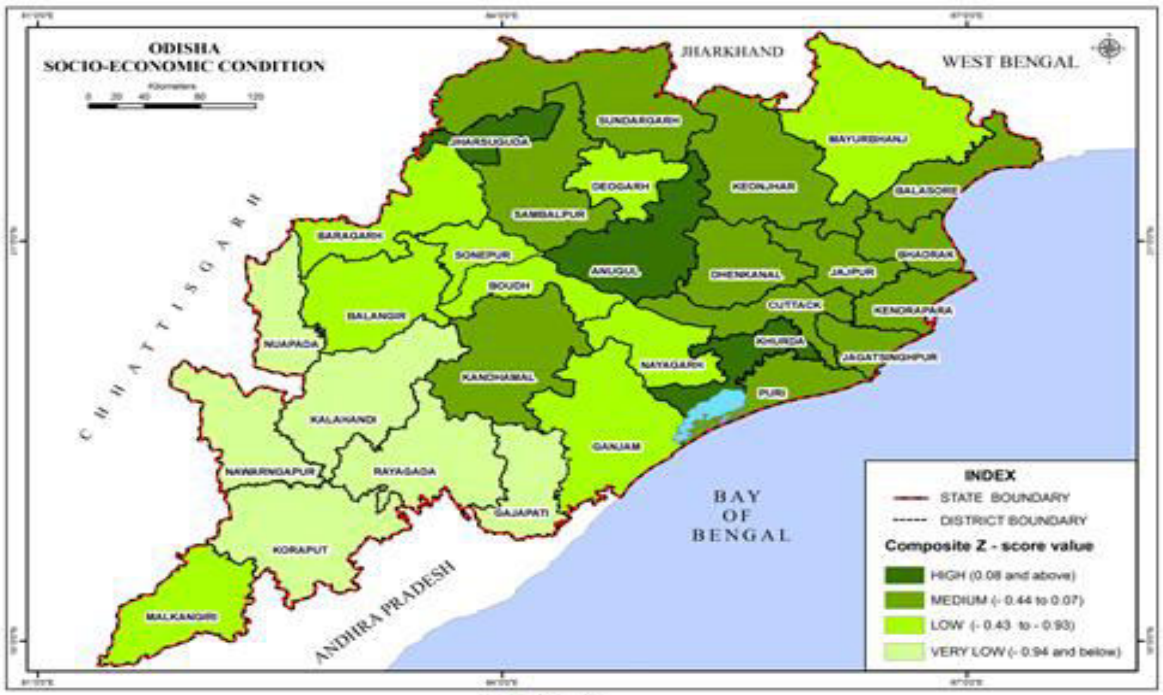


Fig. No.- 2

Table 3. Health status in districts of Odisha: Health Status in Districts of Odisha

Sl.no	Districts	Composite Z- score	Category
1	Bargarh	0.66	Very low
2	Jharsuguda	-0.69	High
3	Sambalpur	-0.2	Medium
4	Debagarh	-0.43	Medium
5	Sundargarh	-0.92	High
6	Kendujhar	-0.2	Medium
7	Mayurbhanj	-0.14	Medium
8	Baleshwar	-0.8	High
9	Bhadrak	-0.28	Medium
10	Kendrapara	0.22	Low
11	Jagatsinghpur	-0.57	Medium
12	Cuttack	-0.46	Medium
13	Jajpur	-0.48	Medium
14	Dhenkanal	0.73	Very low
15	Anugul	-1.03	High
16	Nayagarh	0.33	Low
17	Khordha	0.34	Low
18	Puri	0.56	Low
19	Ganjam	0.39	Low
20	Gajapati	0.32	Low
21	Kandhamal	1.29	Very low
22	Baudha	1.1	Very low
23	Sonpur	-0.8	High
24	Balangir	1.31	Very low
25	Nuapada	-0.07	Medium
26	Kalahandi	-0.26	Medium
27	Rayagada	0.52	Low
28	Nabarangapur	-0.01	Medium
29	Koraput	0.13	Low
30	Malkangiri	-0.18	Medium

Note: The composite z-score value is computed by the authors from the health status indicators

Table 4. Categorization of Districts on the Basis of Health Status in Odisha, 2010-11

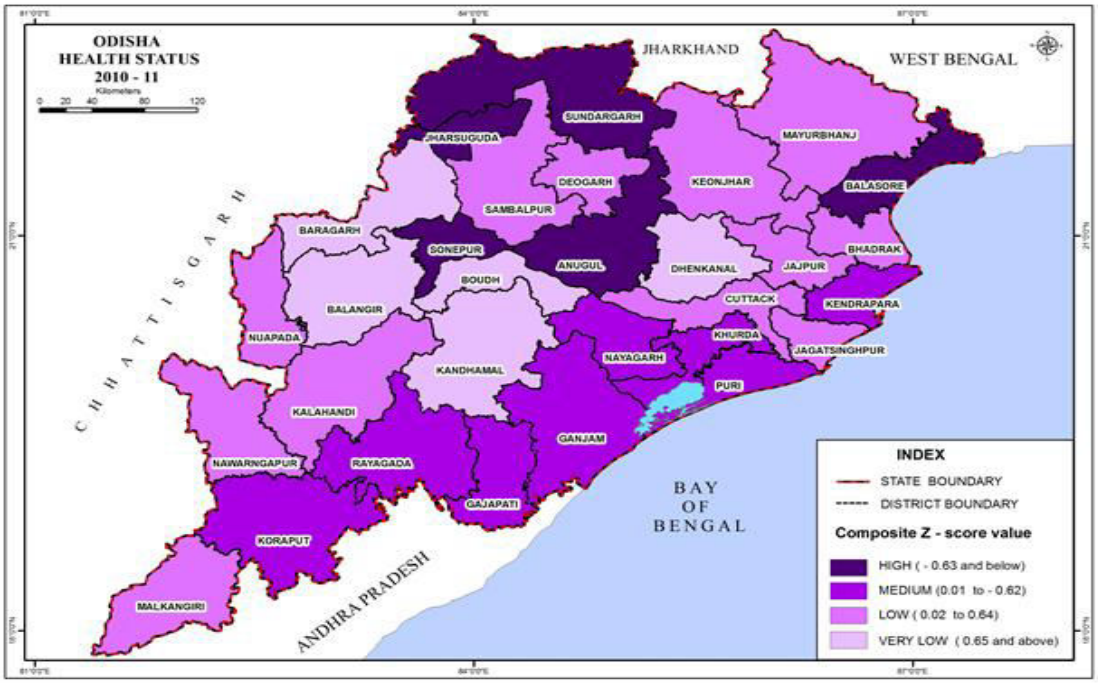
Composite z-score value	Categories	Districts
-0.63 and below	High	Jharsuguda, Sundargarh, Baleshwar, Anugul, Sonepur
0.01 to -0.62	Medium	Sambalpur, Debagarh, Kendujhar, Mayurbhanj, Bhadrak, Jagatsinghpur, Cuttack, Jajpur, Nuapada, Kalahandi, Nabarangapur, Malkangiri
0.02 to 0.64	Low	Kendrapara, Nayagarh, Khordha, Puri, Ganjam, Gajapati, Rayagada, Koraput
0.65 and above	Very low	Balangir, Kandhamal, Baudha, Dhenkanal, Bargarh

Source: Table 3.

It is obvious from Table 4 that five out of thirty districts fall in very low health status having high composite score value i.e. 0.65 and above. These are Balangir (1.31), Kandhamal (1.29), Baudha (1.1), Dhenkanal (0.73), and Bargarh (0.66). Balangir, Kandhamal, and Baudha have high score in maternal mortality and infant mortality whereas Dhenkanal and Bargarh have comparatively better health status but they fall in this group because of high score in crude death rate.

It is worth mentioning that eight districts fall into the category of low health status. This category includes some of the socio- economically advanced coastal districts such as Kendrapara, Khurdha, Puri and Ganjam along with some socio- economically backward districts of southern Odisha like Gajapati, Rayagada and Koraput. Twelve districts fall in the medium health status, namely Sambalpur, Debagarh, Kendujhar, Mayurbhanj, Bhadrak, Jagatsinghpur, Cuttack, Jajpur, Nuapada, Kalahandi, Nabarangapur, and Malkangiri. These districts depict better health status compared to other districts coming under very low and low health status because of their low score in crude death rate. The districts showing high health status are Jharsuguda, Sundargarh, Balasore, Angul and Sonpur. The districts falling under this category are better placed than other districts in terms of all health indicators viz. I.M.R, M.M.R, C.D.R. It is obvious from Figure 3 that better health status is represented by districts of central highlands such as Jharsuguda, Sundargarh, Anugul, and Sonpur. On the other hand, only one district of the coastal belt i.e. Baleshwar comes under this category.

The foregoing analysis, therefore, reveals wide variations in socio-economic conditions and health status among districts of Odisha.



Section-III: Relationship between Socio-Economic Condition and Health Status:

The present study made an attempt to show the association between socio-economic conditions and health status in thirty districts of Odisha. Socio-economic condition is taken as independent variable (X) and health status is the dependent variable (Y) here.

Table 5. Relationship between Socio-Economic Condition and Health Status

Sl.No	Districts	X	Y	X^2	Y^2	XY
1	Bargarh	-0.58	0.66	0.3364	0.4356	-0.3828
2	Jharsuguda	0.62	-0.69	0.3844	0.4761	-0.4278
3	Sambalpur	-0.05	-0.2	0.0025	0.04	0.01
4	Debagarh	-0.5	-0.43	0.25	0.1849	0.215
5	Sundargarh	-0.02	-0.92	0.0004	0.8464	0.0184
6	Kendujhar	0.06	-0.2	0.0036	0.04	-0.012
7	Mayurbhanj	-0.91	-0.14	0.8281	0.0196	0.1274
8	Baleshwar	-0.41	-0.8	0.1681	0.64	0.328
9	Bhadrak	-0.37	-0.28	0.1369	0.0784	0.1036
10	Kendrapara	-0.34	0.22	0.1156	0.0484	-0.0748
11	Jagatsinghpur	0.01	-0.57	0.0001	0.3249	-0.0057
12	Cuttack	0.06	-0.46	0.0036	0.2116	-0.0276
13	Jajpur	-0.29	-0.48	0.0841	0.2304	0.1392
14	Dhenkanal	-0.27	0.73	0.0729	0.5329	-0.1971
15	Anugul	0.46	-1.03	0.2116	1.0609	-0.4738
16	Nayagarh	-0.55	0.33	0.3025	0.1089	-0.1815
17	Khordha	0.31	0.34	0.0961	0.1156	0.1054
18	Puri	-0.29	0.56	0.0841	0.3136	-0.1624
19	Ganjam	-0.51	0.39	0.2601	0.1521	-0.1989
20	Gajapati	-1.03	0.32	1.0609	0.1024	-0.3296
21	Kandhamal	-0.006	1.29	0.000036	1.6641	-0.0774
22	Baudha	-0.52	1.1	0.2704	1.21	-0.572
23	Sonpur	-0.59	-0.8	0.3481	0.64	0.472
24	Balangir	-0.72	1.31	0.5184	1.7161	-0.9432
25	Nuapada	-1.04	-0.07	1.0816	0.0049	0.0728
26	Kalahandi	-0.98	-0.26	0.9604	0.0676	0.2548
27	Rayagada	-1.13	0.52	1.2769	0.2704	-0.5876
28	Nabarangapur	-1.51	-0.01	2.2801	0.0001	0.0151
29	Koraput	-1.07	0.13	1.1449	0.0169	-0.1391
30	Malkangiri	-0.82	-0.18	0.6724	0.0324	0.1476
N=30		$\sum X$ = -12.98	$\sum Y$=0.38	$\sum X^2$=12.95	$\sum Y^2$=11.58	$\sum XY$= -2.71

Note: The above calculation is made on the basis of composite z-scores of socio-economic conditions and Health Status indicators,

As is evident from the above table Correlation coefficient value between these two variables was -0.27. This means the relation between Socio economic condition and health status is moderately negative in Odisha. Thus, the hypothesis that districts having better socio-economic condition have better health status is rejected. A t-test carried out for the correlation coefficient gives a value of -1.47, which is not significant even at 50% level of significance.

6. CONCLUSION:

This paper concludes that there exist wide ranging variations in socio-economic condition and health status among districts of Odisha. It also concludes that the relationship between socio-economic condition and health status is moderately negative which was not found significant even at 50% significance level. So, even though there exists a negative correlation between socio-economic condition and health status one cannot conclude that the data supports a negative causal relationship between the two variables all districts of Odisha. Significantly, it indicates that the health status of a place is not merely a function of socio-economic conditions but also a manifestation of other random factors besides just socio-economic conditions like health infrastructure, transport and communication, sanitation facilities, etc. It may also have to do with attitudes and socio-cultural beliefs of the people, especially in tribal dominated districts like Koraput, Kalahandi and Mayurbhanj, etc where indigenous healing practices dominate over the modern medicine. This gives a scope for further research in the field where the role of these chance correlates may be explored.

Tribal dominated districts like Koraput, Kalahandi and Mayurbhanj, etc where indigenous healing practices dominate over the modern medicine. This gives a scope for further research in the field where the role of these chance correlates may be explored.

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